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21) Application number: **10-146655** (71) Applicant: **TAMA ELECTRIC CO LTD**

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(54) BACK SURFACE LIGHTING DEVICE

(57) Abstract:

PROBLEM TO BE SOLVED: To miniaturize a back surface lighting device, and to save power by providing a lamp support base for fixing both ends of a cylindrical light source and a reflector with inclination in relation to the reflector.

SOLUTION: A back surface lighting device is formed of a reflector 1, a light scattering plate 2, a cylindrical light source 3 and a lamp support base 4. The lamp support base 4 is formed with inclination at θ degree in relation to the reflector 1, and this angle is desirably set at 50-70 degree. The lamp support base 4 is desirably made of a high white-light reflecting material such as polycarbonate in consideration of heat generation at an end of the cylindrical light source 3. With this structure, the whole length of the cylindrical light source 3 can be shortened. Tube voltage is restricted low so as to lower the power consumption by using a cold-cathode tube for the cylindrical light source 3. Furthermore, shade of the lamp support base 4 is eliminated so as to reduce the unevenness of luminance by using the high white-light reflecting material for the lamp support base 4.

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[Claim(s)]

[Claim 1] Tooth-back illumination equipment characterized by to prepare an inclination for the lamp susceptor which fixes the ends and this reflecting plate of the aforementioned cylinder light source to the aforementioned reflecting plate in the tooth-back illumination equipment which consists of the lamp susceptor which fixes the ends and this reflecting plate of the cylinder light source which has an optical diffusion board on the reflecting plate upper surface where upper surface opening is flat, and has been arranged at or more at least 1 parallel at this reflecting plate pars basilaris ossis occipitalis.

[Claim 2] Tooth-back illumination equipment characterized by preparing the degree of tilt angle for a lamp susceptor given in claim 1 term from 50 degrees 70 degrees to the aforementioned reflecting plate.

[Claim 3] Tooth-back illumination equipment characterized for claim 1 term or a lamp susceptor given in claim dyadic by the bird clapper from the white material of a high reflector.

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to liquid crystal display back-with-raised-bands Men [Terumitsu] equipments, such as various display devices especially a word processor, a personal computer, or television, and the tooth-back illumination equipment for large-sized liquid crystal panels.

[0002]

[Description of the Prior Art] Conventional tooth-back illumination equipment was a method as shown in drawing 2 . As shown in drawing 2 , tooth-back illumination equipment consists of a reflecting plate 1, an optical diffusion board 2, the cylinder light source 3, and a lamp susceptor 4. That is, the optical diffusion board 2 was made to carry out incidence diffusion of the direct light emitted from the cylinder light source 3, and the light reflected within a reflecting plate 1, outgoing radiation of the light on a field more uniform than the upper surface was carried out, and it was used as the light source of a liquid crystal display panel.

[0003]

[Problem(s) to be Solved by the Invention] In the conventional method, the lamp susceptor 4 which fixes the ends and the reflecting plate 1 of the cylinder light source 3 was made perpendicular to the reflecting plate 1, and was fixing the cylinder light source 3. Therefore, from the screen, the length of the cylinder light source 3 needed to be made longer than required, and the technical problem to power-saving and a miniaturization occurred with enlargement of various display devices.

[0004]

[Means for Solving the Problem] this invention aims at solving the fault of the conventional

technology which was pointed out above. The composition is a tooth-back illumination equipment configuration of composition of having formed for the inclination the lamp susceptor 4 which fixes the ends and the reflecting plate 1 of the cylinder light source 3 which has the optical diffusion board 2 and has been arranged in parallel with reflecting plate 1 pars basilaris ossis occipitalis to the reflecting plate 1 in the reflecting plate 1 upper surface. Moreover, it is desirable to make the tilt angle into 70 degrees from 50 degrees. By using the white material of a high reflector in the lamp susceptor 4, the shadow of the lamp susceptor 4 disappears and brightness nonuniformity is improved.

[0005]

[Function] By introducing the tooth-back illumination equipment by this invention, the tooth-back illumination equipment used as a miniaturization and power-saving can be offered.

[0006]

[Example 1] Drawing 1 is the example of the tooth-back illumination equipment by this invention. Drawing 1 is the cross section of tooth-back illumination equipment, it is a reflecting plate 1, the optical diffusion board 2, the cylinder light source 3, and tooth-back illumination equipment that consists of lamp susceptors 4 and is used for the display device of 18 inch size in this example, and the cylinder light source 3 has an outer diameter of 3mm, and structure used eight by the bore cold cathode tube of 2.6mm in this case.

[0007] Furthermore, it has structure which prepared the degree of tilt angle to the reflecting plate 1, and has the 60 degrees of tilt angle to the reflecting plate 1 in this example. A result with this angle equivalent as for 70 degrees from 50 degrees is obtained. Although the lamp susceptor 4 is a white high reflector and the polycarbonate is used in consideration of generation of heat of cylinder light source 3 edge, polymethylmethacrylate material white otherwise and white polyester film are stuck, and a result also with equivalent Eby Toray Industries, Inc. 60L is obtained especially.

[0008]

[Effect of the Invention] Tooth-back illumination equipment of structure like the example of the above-mentioned publication became possible [shortening the overall length of the cylinder light source 3 20mm or more by average-luminance 7000 cd/m² on the optical diffusion board 2 in the 18 inches size of display devices as compared with a conventional method]. moreover, the cylinder light source 3 -- a cold cathode tube -- using -- tube voltage -- per [35 / about] one -- V -- being able to press down low and using the eight cylinder light sources 3 -- power consumption -- about -- the power can be saved 2W The lamp susceptor 4 was white, by using the polycarbonate in consideration of generation of heat of a high reflector and cylinder light source 3 edge, the shadow of the lamp susceptor 4 disappeared and brightness nonuniformity has also been improved. Therefore, the tooth-back illumination equipment which can respond to power-saving accompanying enlargement of various display devices and a miniaturization can be offered. If, as for the tooth-back illumination equipment of structure still like the example of the above-mentioned publication, a display device becomes small, the effect of power saving

will increase further.

[Brief Description of the Drawings]

[Drawing 1] It is the cross section showing the example of this invention.

[Drawing 2] It is the conventional front view and the conventional cross section of tooth-back illumination equipment.

[Description of Notations]

- 1: Reflecting plate
- 2: Optical diffusion board
- 3: Cylinder light source
- 4: Lamp susceptor
- θ : The degree of tilt angle